must be separately maintained and made available for public inspection and copying. The third category of federally maintained materials includes all other written matter in the agency's possession, and is subject to inspection and copying by the public if the request reasonably describes the records, as long as the records are not subject to one of the Act's nine disclosure exemptions. Thus the FOIA has the effect of encouraging agencies to identify three distinct categories of written data, as well as encouraging the agencies to organize and maintain records according to this categorization.

A second information management consequence of the FOIA results from the Act's requirement that before denying public access to a document, agencies must identify the "reasonably segregable" portions of it that do not qualify for protection from disclosure. Those portions of the document must be released for public scrutiny upon request. Agencies that receive numerous FOIA requests have an incentive to organize their files by segregating public and nonpublic documents or portions of documents. Thus, several agencies have reorganized parts of their filing systems to reflect this distinction.[40]

Demands and Effects of FOIA. The Act also puts time limits on information agencies' answering of public requests—ten working days to notify the requester as to whether or not the agency will comply with the request, twenty days to make a determination if there is a public appeal resulting from the denial of a request. There are also provisions for extending the search time for answering information requests by ten days under certain circumstances. In addition, there is a requirement that reasonable fees be charged, not to exceed document search and duplication costs, with a waiver or reduction of fee for information of primary benefit to the general public.

Agency attempts to comply with FOIA access requests have also led to information management changes. Although only a few agencies—mostly those with law enforcement or intelligence missions—have been swamped with access requests, the majority of agencies have established separate Freedom of Information offices and directors (often these offices also have responsibility for Privacy Act compliance). Agency data management practices appear more and more to be geared toward the needs of FOIA and Privacy Act compliance.

Data Management to Avoid Access. According to some reports, the FOIA has also had the effect of altering the location or the retrieval mechanism for some documents and record systems. In short, the incomplete coverage of the federal access statutes may be having the effect of altering and distorting normal information management and maintenance practices. For example, some agencies maintain data elsewhere than in their own organizations, in order to escape the necessity of disclosing materials through an access request. Data held by Congress, its research and investigative agencies, or federal contractors, is not subject to access under the FOIA. Furthermore, the FOIA does not cover data that is not put in writing.

Effective Management Concepts

A number of concepts have been applied by information systems managers, policymakers, users, and others to improve users' abilities to get needed information, and to increase the cost-effectiveness of managing information. Some of these concepts of information management involve the introduction of new technologies or more creative uses of old ones. Other management concepts concern the improvement of information organization, and planning for information uses. Still other management theories involve the introduction of methods for determining the acquisition and maintenance costs of specific information, services, or technologies. A discussion of some of these concepts and mechanisms for implementing them follows.

Data Sharing

When programs or agencies are able to share data, data collection and maintenance activities, then duplication, excessive reporting burdens, and dollar costs can be cut down. Telecommunications and computer technologies have made it more economically feasible for users with similar interests to share data access through interconnecting information systems. It has become possible to "plug into" systems which are either physically distant or organizationally removed from the user in order to get needed data. Such data sharing limits the need to duplicate collection, and makes available a wide variety of data bases to an increasingly wider audience through the mechanism of networking.

However, systems designed to increase data may require limits on the amount of data in the system and the number of participating users. A system that serves too many users with highly diverse interests forces an organization to choose between having a very costly, individualistic system, and a less expensive general system in which the required standardization results in a loss of control at the individual unit level.

Tailoring MIS to Different Needs. A study of billing systems in two hospitals[41] illustrates the appropriateness in some circumstances of separate, more focused management information systems within an organization. Although the illustration does not come from a study of federal hospitals, the general lessons from the hospital study could apply to federal management information systems. The study of these particular hospitals was undertaken because bills, calculated and distributed by new, comprehensive MIS, were systematically being sent to the wrong people, causing serious financial shortages to the hospitals. The systems were installed in order to combine the entire staff's information needs, reduce costs, and allow for more flexible manipulation of data. The result of the system's installation, however, was to make it impossible for certain critical functions to be performed correctly.

Hospital Case Shows MIS Failure. The study analyzed the various causes for the system's failure. Under the old, less efficient system, each unit had an MIS that was

largely independent of the others. Each MIS kept its own schedule, followed its own rules, made its own priorities. Praise or blame could be assessed and traced to its source. Duplication, overlap, and redundancy vastly reduced the need for coordination. Time mattered within units but not between them. Status differences between units were neutralized insofar as their effects on MIS were concerned. All this changed with the new comprehensive MIS. Each unit was responsible for a portion of the new general-purpose form, which had to pass through all units within a certain time and in the specified order. Lateness in one unit was ramified throughout the others. Status differentials were magnified. How could the billing unit coerce the medical unit, which was too busy saving lives to push papers? Coordination changed from automatic reflex to apocalyptic chaos.

The hospital situation suggests that there must be a balance achieved between particularity and generality in the plan for an efficient information system, and these variables must be considered in relation to the specific circumstances surrounding the establishment or expansion of MIS. Nevertheless, despite the potential problems of data sharing, the movement toward integrated office information systems is growing. Such systems can facilitate the provision of data needed for decision-making, provide more efficient typing, copying, and message services, and assist in the efficient management of an organization.

MIS in the White House. A notable example of such a system is the one being set up to improve decision-making capacity in the White House.[42] The theory behind the system's design is the belief that improvements in communication will work to improve operations. The system attempts to integrate data processing, publishing, microfilms, television, word processing, telegrams, computer graphics, and mail. In addition, the White House has been experimenting with the Domestic Information Display System,[43] a mechanism which combines NASA technology and Bureau of Census Data, in full color graphic displays of maps of the U.S. and the states, in an interactive system for retrieving statistical information.

Network Service Links Data. Another approach to increased sharing of federally maintained data is through the creation of the Federal Information Locator Service. The Commission on Federal Paperwork (CFPW) has recommended a networking service involving MIS which would make data held by the government more readily available both to the general public and to government agencies. This networking system would also identify duplication and other reporting burdens, and would coordinate federal, state, and local information requirements. It would combine the functions of a registration, inventory, and index mechanism, which would facilitate locating various types of information without necessarily providing the information itself.[44] A similar stipulation to make government data more easily available appears in the Paperwork Reduction Act of 1980. Of course, any grand scheme for coordinating the management of data carries with it its own considerable dollar cost, and policymakers must weigh the cost of any proposed scheme against the costs of handling information by current methods.

Involvement of Users in Designing the Information Systems

Some information scientists have suggested the need to involve users more actively in designing the systems which are intended to service them. But systems design is still not as effective in providing the precise data needed as it must be, if information managers and users are to cope with the vast amounts of data available. In the absence of training and incentives for cooperation, undisciplined behavior by users is predictable. They ask for more than they can conceivably use because there is no cost involved, and because they are not knowledgeable enough to be specific in their request. By changing their minds frequently, users create problems for MIS.

Demands for Changes in MIS. The volume of requests is often less of a problem for producers than the frequency of requested changes in format. In part, the profusion of alterations is inevitable: as demands on a unit change, so does the unit's demand for data. Also, as technical possibilities increase, there are more requests made to MIS, because much more in the data processing field is now known to be technologically possible. In this respect, however, in the case of many users inner anxiety appears to exceed outer stress. Rather than resorting to bootlegging by updating old information systems, users first attempt to pass on anxieties concerning the organization of the data system to producers. When there is no requirement to establish priorities, there frequently are no rules reserving format changes for specified times, or reducing the number of these changes.

Today it is generally accepted that designers of MIS should interview users, discuss their needs, and even describe the specifications for meeting them. But this approach does not always succeed. Frequently users do not know or cannot articulate what they want, and MIS designers cannot tell by a few interviews what users need. If this situation arises, it might be useful for designers and users to adopt the direct discourse of decision-making. Their effort would be focused not on data or on particular information, but on obtaining knowledge needed to achieve specific desirable consequences.

Identification of Data Needed. Precisely identifying the data wanted may be particularly difficult for top level decision-makers in organizations. At any time within an organization there may be many actual and possible goals. Constraints, such as resource limits, law, and morality, etc., must be considered as types of restrictive goals. In addition, the potential agenda of organizational leaders may involve many more broad and nebulous goals than can be stated at the outset of a project. Executives frequently wait for favorable opportunities for action, seize them if they can, and claim that these actions were always their objectives, recognizing that seizing targets of opportunity is an important part of leadership.[45] As events occur

with both intended and unintended results, the consequences can be retrospectively rationalized as organizational goals.[46] With the multitude of possible consequences emerging to be designated as belated goals or objectives, it thus becomes difficult for executives to define the data they need in advance.

Symbolic Significance of MIS. Executives also overinvest in data collection and processing, because the acts of seeking and using information in decisions have important symbolic value. Employing data and justifying decisions in terms of information are significant ways in which administrations and organizations signal that the process is legitimate, and that organizations are well-managed. Since legitimacy is a necessary attribute of effective decisions and organizations, there is incentive for conspicuous generation of information, even though only a small amount of the data will be used.

The value of data depends on how effectively it is used and for what purpose, as well as on its intrinsic merit. Even an error in the data may be more or less important, depending on the use to which it is put. Only users can convert data to information, and top executives and others who rely on MIS support for decision-making need to think critically about what sort of data they need to influence decisions. One step in involving users in information systems design that has been suggested is to make a thorough examination of who uses information in systems, and for what purposes, in order to make intelligent determinations about collecting, maintaining, and purging data to create more useful systems.[47] Pragmatic research about current practices of MIS users could provide significant clues as to effective user participation in designing management information systems.

Policy Level Decision-Making about Information Management

High level personnel within an organization need to take a more active role in planning for the satisfaction of information needs in an organization. Fulfilling information needs is considered important, both with regard to purchase of technology and the collection, maintenance, and use of data. Generally, decisions about data collection, storage, and dissemination are made by those in charge of information systems, rather than by high level managers. This phenomenon is particularly prevalent when data processing or other types of computerized data bases are involved.

Lack of High Level MIS Planning. Historically, decisions about information management are not made by high level personnel because the mystique attached to programming and operating computers has been reserved to persons with specialized training and skills. This practice has been predicated on the assumption that managers and policymakers, untrained in computer science, cannot make reasonable decisions about the substance of the data to be maintained in automated systems. The result of this practice is often the perpetuation of duplicative systems within an organization, the maintenance of data irrelevant to user needs, and an absence of planning and oversight to ensure a consistent, cost-effective approach to managing information.

The GAO Report on Federal Bibliographic Systems criticizes this approach within the Federal Government, and recommends that each agency designate an official at the policy level to oversee information management, and to plan for its effective use within the agency as a whole.[48] Similar points are raised in the Committee Print on Scientific and Technical Information[49] and in the President's Reorganization Project Report.[50]

Coordination among Agencies and Organizations with Similar Responsibilities for Information

Information handling activities within an organization or among organizations and agencies should be coordinated, whether or not the data and equipment are shared. In the scientific and technical communities, coordination among research establishments and universities would aid the transfer of data needed for scientific research. To some extent coordination of scientific data has been achieved through the establishment of discipline-oriented indexing and abstracting services, and bibliographic data bases. The experiments with the Federal Information Centers, which are attempting to act as referral and resource programs to help the public learn about various Federal Government activities, require a great deal of close coordination.

In the area of federal ADP procurement, the agencies responsible for ensuring competitive and cost-effective purchases of this equipment—OMB, Commerce, and GSA—have been criticized for their failure to act as a management team and to coordinate their activities. The critics admit, however, that solutions are not easy to achieve when there is chronic understaffing, confusion about agency interrelationships, poorly drawn policy documents, and a budget-oriented approach to resolving management problems.[51]

Interagency Information Management. The recent reorganizaton of OMB, which created an Assistant Director for Regulatory and Information Policy, addresses the need within the Federal Government for improved interagency coordination. One function of this office will be to develop a comprehensive policy regarding the utilization of information management systems within the Federal Government.

This sort of coordinating role has also been assigned to the Department of Education under the Education Amendments of 1978 (Pub. L. No. 95-561). The Federal Education Data Acquisition Council (FEDAC) was established as a result of the Paperwork Commission's recommendation that agencies desiring data take primary responsibility for reducing reporting burdens. Congress mandated that the Department of Education set up the Council to develop and monitor a consistent process for collecting data from educational institutions. Although all federal agencies collecting such data are included within

the Council's authority, in the early stages it is concentrating on programs within the Department of Education. The mandate's purpose is to reduce the paperwork burden federal agencies impose on educational agencies and institutions, while ensuring that data is collected by the most efficient and effective methods.

Each agency must develop a plan for approval by the Council, including a detailed justification of how information will be used, how the activity was developed, evidence of early involvement and communication with those from whom information is collected, and estimates of average costs and time required of those supplying the information to comply with requests for data. Although it is too soon to tell whether the Council's approach to reducing reporting burdens will be successful, this effort represents an attempt to compel agencies to think concretely about their data needs, and reveals the Council's recognition that there is a cost to both agency and respondent in collecting more information than is necessary for program decisions.

Education and Training in Information Management, and Use of New Information Technologies and Services

Education and training are important to help many different types of individuals cope with the complexities of information management emerging from increased use of telecommunications and computer technologies. These include university and post-graduate level training of computer and communications scientists, engineers, librarians, historians, journalists, TV broadcasters, and information managers, as well as technical courses for programmers, a variety of technicians and equipment operators, clerical and secretarial personnel, and users. This last category is coming to include managers, policymakers, doctors, attorneys, nurses, teachers, and many others.

The National Archives and Records Service is concerned with providing training for federal employees in the records management aspects of MIS. The Paperwork Commission recommended that more high level managerial personnel should be encouraged to attend this program.[32]

A Conference Board Report on information technology cites training in the use of information technologies and services as a critical need. It stresses that high school and university level courses are a top priority if there is to be the manpower to take advantage of the new information technologies.[33]

Cost Effectiveness Measures

Adequate measues of cost-effectiveness in managing information—that is, measuring dollar cost against social value—though difficult to achieve, are essential to realistic appraisals of the worth of MIS. It has been suggested that to manage information cost-effectively the Federal Government should: (1) maximize the value and benefits from using information in achieving its goals and objectives; (2) minimize the cost of acquiring, processing, using and disposing of information; and (3) assign accountability for the use of information.[34] These principles could be applied more generally to the management of information.

Recognizing the Cost of MIS. Before organizations can measure the cost of managing data, they must understand that it has economic cost. While the Federal Government generally considers data as free goods, even in the most cost-conscious companies the last consideration to be quantified is usually the cost of managing data. When funding of MIS is financed on a central basis as part of overhead, the cost assigned to individual systems may be arbitrary. MIS may be considered a good in and of itself, part of the "more is better" syndrome, so that higher overall costs may be viewed as evidence of increased productivity. It may be costly to keep records on MIS costs, and there may be inadequate cost data on MIS because of the suspicion that if the true costs were known, the systems might turn out not to be cost-effective.

Reducing the Cost of MIS. Reduction in the amount of data collected, processed, and used would reduce the costs of MIS within an organization. It is difficult for a complex organization to control the various units that produce and use data. From the viewpoint of any one component of a complex organization, increasing and controlling its data needs do not appear to have much impact on the functioning of MIS within the total organization. Since one unit or user can control only the smallest part of the data produced, the incremental advantage of reducing its requests may appear infinitesimal. A single data source may not see itself as large enough to make a significant contribution to the total. Overload can only be reduced by collective action, but it is difficult for producers and users to get together. This lack of collective capacity to reduce data, and inability of any single unit acting alone to stem the flow, leads to data over-production. One possible solution—to have users pay the full cost of data—might reduce the volume of requests for data and consequently reduce its production. This approach is not widely used in the Federal Government, although some private companies have adopted it.

Constant Maintenance of MIS. If MIS costs are to be reduced in the long run, management information systems must be continously maintained after they are established. Consequently, systems must continuously be reexamined and kept up to date. Just as software may be more expensive than hardware, maintenance may be more expensive than establishment of MIS. However, in organizational budgets, often the highest cost is assigned to start-up a management information system, a meager amount to follow-up, and virtually none to follow through. This lack of budgetary foresight can result in surprise when the system is installed and works for a time, and six months or a year later has broken down, costing more to repair than it did to create.

The increase in reliability, reduction of breakdown, and decrease in error are functions which are as impor-

tant as collecting and preparing data for MIS. In analyzing the expense of operating MIS, the total cost is not entirely in producing output for others, but in substantially improving input for itself as well. Another important factor to consider in the effort to reduce cost is the necessity to retrain the data production and retrieval personnel in operating a revised system, in the event of changes in the data format or handling.

Cost Accounting Needed for Information. As part of the stress on cost-effectiveness, there is much discussion concerning the need to establish methods of cost accounting for information—in other words, computing the dollar cost of handling information according to recognized accounting principles—including the introduction of line items into organizational budgets and government agency funding requests. The Commission on Federal Paperwork has suggested that management must begin to understand that information is a resource with fundamental value, measurable characteristics, transformable into useful output, and something that can be related either to expense or capital investment. Operating according to the concept that information is a measurable commodity, agencies can then develop standard costs and cost accounting techniques to control expenses regarding information, and can weigh information investments in balances against manpower or capital investments, and in regard to return on investment.

Such economic determinations would enable managers to identify and measure information throughout its life cycle, plan for its use, budget it separately from overhead, and estimate its value against the cost to providers and the organization of its collection. Managers could then account for and audit information to ensure reasonable costs for its effective use.[55] Similarly, the GAO Report on Federal Bibliographic Systems urges the Director of OMB to require each federal department to "maintain adequate cost accounting records to serve as a basis for implementing an effective cost recovery program for bibliographic information."[56]

Federal Problems in Information Management. The President's Reorganization Project identified cost-effectiveness and cost-accounting deficiencies in government management of information. The first deficiency in government management was attributed to the fact that the government does not recognize that the "capabilities, cost-effectiveness, and range of available information technology products and services have advanced far beyond 1965," and consequently the government is not organized to take advantage of new opportunities. Second, there is a serious problem of obsolescence of ADP equipment, with resulting costs in information production and low employee morale. Third, there are inadequate performance and productivity measures, as well as inadequate cost-accounting systems, and a lack of philosophy about cost accounting. The Reorganization Project Report urged agencies to "generate a cost-and-performance-conscious environment . . . create a climate of competition, for the privilege of serving in the information technology services area . . . and require plans for future improvements."[57]

Improving Costs and Accountability. These various suggestions for improving accountability and making more accurate judgments about the cost of MIS are difficult to implement. Even the terminology used to describe them is imprecise. More research is necessary to develop effective procedures for determining the costs and benefits of MIS within particular organizations. One approach, putting the burden of determining costs on users, is worth considering, although it changes the focus of calculation from the front to the back end of the MIS process, and in so doing appears to challenge fundamental assumptions about measuring costs of MIS.

If there were competing demands on users for the money that they had available to spend on data, or competing places to buy the same data, the producers of data would have to design their products competitively, cut costs by cutting excess data, or produce data of higher quality and greater value to users. Realistic measurement of the value of the data to users might then be possible.

Future of Information Systems in Government

Rapidly evolving technology is making it possible to use computers in new and different ways in organizations. These technological improvements will permit the development of more integrative and flexible information systems. Some of the basic characteristics of these systems will be:

- More cost-efficient powerful computers which will promote the development of decentralized interactive information systems;
- Integration of communication, word processing, and data processing—a total electronic environment;
- More automated modes of data input;
- Direct interaction by non-technicians with data, which will enable them to make their own modifications, and use their own cognitive processes on the system to convert data into information; and
- Integrated data bases which permit the sharing of data between applications.

As systems evolve in these future directions they will come to represent entirely new types of systems, which will make possible or even require new types of organizational forms. Current systems literature is beginning to advance beyond the traditional notions of information systems, both in terms of conceptions and terminology. Alternative terminology such as Decision Support Systems (DSS)[58] is being increasingly used instead of MIS. It is therefore misleading to assume that problems which existed in the past will necessarily constrain the creative use of data in the future.

Cost-Effectiveness Must be Considered. Much of the current problem of operating MIS can be attributed to the inadequacy of technology, combined with the absence of managerial or legislative traditions for thinking of data

as an organizational resource subject to cost-effectiveness. Given the dramatic improvements that are now being made in hardware, the primary technical constraint is the result of existing procurement procedures, which favor the use of obsolescent equipment. Managerial traditions which consider data as a resource are unlikely to evolve towards consideration of data on a cost-effective basis without changes in legislative and governance processes that focus on data usage as part of the oversight process. Data resembles money in that they both have value; and thus neither can be considered as a free good or free resource. The only difference between data and money is that the Federal Government has traditionally and actively evaluated and constrained the use of money, whereas, there have never been government supervised budgetary constraints imposed on data creation and dissemination. Agencies are generally evaluated on their performance in relation to the use of funds. There should be similar governance procedures for an agency's use of data resources. In the absence of formal procedures linking agency performance on data use to its fiscal appropriations, it is not likely that agencies will make an effort to manage their data resources rationally.

Possibility of Linking Data to Economics. Is an approach linking data control to economic controls feasible? Can effective legislative oversight of agency MIS exist, and can such an approach produce managerial responsiveness? While such notions are too new for a definitive answer, there is some encouraging preliminary evidence (described earlier) in the abolition of the Renegotiation Board and the creation of FEDAC. The Renegotiation Board was an independent federal agency that was established in 1941 to prevent excessive profits on sales to the government. While it is unusual for government agencies to be abolished, the driving force in this case was the cost-effectiveness of the data burden imposed. It was annually costing taxpayers $7 million, and government contractors $250 million, and was recovering less than $10 million a year in excess profits.[59]

As a result of the legislatively mandated FEDAC, a data dictionary and redundancy checking system were developed and installed in the Department of Education. Internal enforcement of the requirement resulted in a reported 13 percent decrease in the number of hours needed to fill out the 160 data acquisition forms reviewed between April and December, 1979.[60] Clearly, the effort to date has not been a total success. Manpower shortages are making it difficult to keep the dictionary current, and there has been no noticeable translation from judgments about redundancy to analysis of the necessity for specific data collection efforts. But it is a promising start.

Conclusion

Current literature, the work of the CFPW, Congressional committees, and the recommendations of the proposed reorganizations within the Federal Government indicate that it may be possible to create managerial and legislative traditions that focus on data as resource. Such traditions could then be combined with advancing technology to produce more effective and useful information systems. Even though such traditions may evolve slowly, it is important to begin to develop them.

It may be best to proceed cautiously because of the limited knowledge currently available concerning: (a) how organizations value and utilize data, (b) how to measure the benefits of computer use in non-standardized organizational decision-making, (c) how to account for data use, and (d) the cost-effectiveness of various controls and standardization efforts.

Exploration of Management Philosophies. Current procurement policy provides a good example of our need to know more about how to make MIS cost-effective. Existing centralized procurement controls focus on front end costs that comprise approximately 10 percent of the overall cost of the system, and impose a very large cost in paperwork and time on the agencies. Some believe that centralized controls contribute to the obsolescence of existing equipment, and provide no incentive for organizations to develop effective systems. The problem may be the result of poor management of current procurement policy. But, it is possible that such a front end approach to procurement is simply not cost-effective, and that an alternative approach, like decentralized control over purchases for MIS, should be tried. It is important in an environment of rapid technological change not to adhere blindly to current management philosophies, which suggest that massive centralized controls and rigid standards are necessarily preferable or even relevant to all aspects of data management. When it comes to MIS, we are increasingly aware of what we do not know, and what we need to learn about formulating policies to enhance their effective utilization. In the next decade we need to allocate resources to more carefully defined, better targeted efforts to realize the enormous promise of management information systems in increased productivity and improved decision-making.

Notes

[1] U.S., Office of Management and Budget, *Memorandum to Associates in Information Technology: Federal Data Processing Resources*, 25 January 1980, p. 13.

[2] *Ibid.*, p. 2.

[3] U.S., Commission on Federal Paperwork, *Information Resources Management in Federal Agencies* (Government Printing Office), 9 September 1977, p. 2.

[4] *Ibid.*, p. 2.

[5] Herbert Simon, "Designing Organizations for an Information-Rich World," *Computers, Communications and the Public Interest*, ed. Martin Greenberger, (Baltimore: Johns Hopkins Press, 1971), p. 40.

[6] U.S., Office of Management and Budget, Federal Statistical System Project: *Issues and Options*, 30 November 1978, pp. 1-9.

[7] For a discussion of this phenomenon, see Vincent Guiliano, *Crossing the Threshold into the Information Age*, vol. 1 (Boston: Arthur D. Little, Inc., 1978).

[8] U.S., Commission on Federal Paperwork, *Information Resources Management in Federal Agencies* (Government Printing Office), 9 September 1977, p. 3.

[9] *Ibid.*, p. 8.

[10] U.S., Commission on Federal Paperwork, *Federal Locator System* (Government Printing Office), p. 3.

[11] *Ibid.*, p. 90.

[12] U.S., Government Accounting Office, Report to the Congress, *Better Information Management Policies Needed—A Study of Scientific and Technical Bibliographic Services*, August 1979, pp. iii, iv.

[13] J. C. R. Licklider and A. Vezza, "Applications of Information Networks," *Proceedings of the Institute of Electrical and Electronic Engineers (I.E.E.E.)*, vol. 66, no. ii, 1978.

[14] U.S., Office of Management and Budget, Federal Statistical System Project: *Issues and Options*, 30 November 1978, Ch. 3, p. 3.

[15] The Privacy Act of 1974, Public Law No. 93-570, Section 552 a(e)(i).

[16] U.S., Commission on Federal Paperwork, *Information Resources Management in Federal Agencies*, pp. 31 et seq.

[17] U.S., Congress, Senate, *Congressional Record*, 96th Cong., 2nd sess., 19 November 1980, pp. S14682-14704.

[18] U.S., Office of Management and Budget, Federal Statistical System Project: *Issues and Options*, 30 November 1978, pp. 1-9.

[19] U.S., Office of Management and Budget, *Operational Management Team Report: Federal Data Processing Reorganization Study*, September 1978, pp. 1-12.

[20] U.S., Government Accounting Office, Report to the Congress, *Better Information Management Policies Needed—A Study of Scientific and Technical Bibliographic Services*, August 1979, p. 2, et seq.

[21] U.S., Commission on Federal Paperwork, *Information Resources Management in Federal Agencies* (Government Printing Office), 9 September 1977, p. 9.

[22] President Carter's State of the Union Address, January 20, 1980.

[23] 44 *U.S. Code Annotated*, 3501-3512 (1969 & West Supp. 1980).

[24] *Ibid.*

[25] *Ibid.*

[26] *Ibid.*

[27] *Ibid.*

[28] U.S., Commission on Federal Paperwork, *Information Resources Management in Federal Agencies* (Government Printing Office), 9 September 1977, p. 20.

[29] See for example, U.S., Congress, House, 96th Cong., 1st sess., 1979, H. Rept. 62.

[30] U.S., Executive Office of the President, Office of Management and Budget, Report to the President and Congress, *Paperwork and Red Tape—New Perspectives, New Directions*, June 1978.

[31] *Ibid.*, pp. 22-25.

[32] 44 *U.S. Code Annotated*, Chapter 29 (1969 & West Supp. 1980).

[33] U.S., Commission on Federal Paperwork, *Information Resources Management in Federal Agencies* (Government Printing Office), 9 September 1977, p. 23.

[34] *Ibid.*, pp. 16, 17.

[35] *Ibid.*, pp. 21, 22.

[36] U.S., Office of Management and Budget, *Security of Federal Automated Information Systems*, (Circular no. A-71), 27 July 1978.

[37] Procurement of ADP Resources by the Federal Government, Public Law No. 89-306. See U.S., Commission on Federal Paperwork, *Information Resources Management in Federal Agencies* (Government Printing Office), 9 September 1977, p. 25.

[38] U.S., Executive Office of the President, Central Agencies Team Report, *Federal Data Processing Reorganization Study*, December 1978, Ch. 4, pp. 2-3.

[39] *Ibid.*, Ch. 4, pp. 3-6.

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[44] See for example, U.S., Congress, House, 96th Cong., 1st sess., 1979, H. Rept. 62.

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[47] James T. McIntyre, Jr., Director of the U.S. Office of Management and Budget, Memorandum to the President of the United States, President of the Senate, and the Speaker of the House of Representatives, 30 October 1978, p. 8.

[48] U.S., Government Accounting Office, Report to the Congress, *Better Information Management Policies Needed—A Study of Scientific and Technical Bibliographic Services*, August 1979, p. iii.

[49] U.S., Congress, House, Subcommittee on Science, Research and Technology of the Committee on Science and Technology, Print on *Scientific and Technical Information (STI) Activities: Issues and Opportunities*, 95th Cong., 2d sess., 1978.

[50] U.S., Executive Office of the President, Central Agencies Team Report, *Federal Data Processing Reorganization Study*, December 1978, Ch. 9, p. 2.

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[52] U.S., Commission on Federal Paperwork, *Records Management in Federal Agencies*, Government Printing Office, 9 September 1977.

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AFTERWORD

International Implications of Information Policy

A review of the legal and economic foundations of United States domestic information policy reveals a host of international information policy issues, the resolution of which directly involves the United States in negotiations with other nations. Concerns similar to those in both industrialized nations and developing countries are reflected in United States domestic policy. A few examples of international information policy issues will demonstrate the common concerns of the United States and other nations.

- The telephone and mail services industries in the United States are becoming increasingly competitive, and their deregulation may be fast approaching. As United States services interconnect with government-owned and operated facilities in other nations, significant questions arise about such matters as pricing policies, negotiating representatives, and definitions of universal service.
- As United States data bases become increasingly accessible to users in other countries, questions arise in particular about the sharing of United States government-generated information. Under the Freedom of Information Act, this information is available to requesters the world over, with no requirement of reciprocity from foreign governments.
- The knotty problems of United States copyright law, particularly regarding consent for copying and eligibility of a work for copyright, take on new dimensions as electronic systems speed creative works of Americans to consumers in all corners of the world.
- The domestic conflict that inevitably arises between protection of personal information and open availability and accessibility of information in general, becomes even more complex as personal information is regularly transmitted across national boundaries.

These issues are a mere sampling of the kinds of information problems that will come before the Organization for Economic Cooperation and Development and other international forums for discussion and debate in the years to come. The United States looks forward to reaching accords in an atmosphere of mutal understanding of each country's domestic information policy objectives.

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